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ABSTRACT

This paper describes the problems and successes associated with the introduction of a compulsory computer literacy course to approximately 600 professional year students in the Faculty of Education Department at the University of Calgary (Alberta, Canada) during the fall 1984 and spring 1985 semesters. The events leading up to the introduction of the course are explained and descriptions are provided of problems encountered in implementing the course, including budget restrictions; insufficient staffing for course development; lack of available hardware and software; scheduling of professional year student classes; and limited classroom space. On the more positive side, the staff felt that that most course objectives were met, and the majority of students gave the course a favorable rating. It was concluded that: (1) the course should be piloted; (2) instructors must be prepared to spend a great deal of time for teaching and evaluating the course; (3) the course could be used for operational research; (4) the programming component should be reduced and more computer literacy content included; (5) learning theories should be used in course development; and (6) instructors should be prepared to be in a constant state of change. Data for the two semesters are compared for three dimensions of the evaluation: the time allotments for specific topics covered, number and weighting of assignments and examinations toward the grade, and student ratings of the course. A six-item bibliography is provided. (DJR)

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ADVENTURES WITH A COMPULSORY COMPUTER LITERACY COURSE IN THE PRACTICUM YEAR*

by

Donald B. Black

The University of Calgary

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What is about to unfold is the saga of the introduction of an untried, under-funded and under-equipped computer literacy course to approximately 600 professional year students in the Faculty of Education at the University of Calgary during the 1984-5 academic year. It is believed that the U of C is the first teacher education institution in Canada, if not North America, to impose such a requirement for graduation. Given the circumstances of its offering, it is a tribute to its students and instructors alike, that the course (EDTS 425) has so admirably met the objectives set for it. This has not been without its costs, however. This paper proposes to tell its story and to offer some suggestions to those who would offer a similar course.

By way of background, the Province of Alberta through the direct interest of its Minister of Education, David King, has actively encouraged the introduction of microcomputers into each classroom. This interest can be seen in a variety of actions: subsidized purchase programs, establishment of the Alberta Clearinghouse, and so on. Specialist services have sprung up within the larger school units. Within the Faculty, two committees studied the problem. The first was a Dean's ad hoc committee established to examine technology in the

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classroom. The second included the need for computer literacy as part of the Department of Teacher Education and Supervision's overall review of its mandate for the CORE curriculum. Neither committee's recommendations were attended to in full other than the Faculty of Education Council approved at its Spring (1984) meeting, first, the immediate introduction that fall (September) of a computer literacy course, and second, the deletion of a course in instructional psychology and learning theory to "make room" for it. Inasmuch as the author was on sabbatical leave at this time, he was not privy to the political dynamics leading to these decisions, nor are they germaine to this paper. What was important was that a course was approved for fall introduction without the usual "paper" and without the benefit of a trial offering. Ten thousand dollars were to be set aside for software. Additional hardware beyond that available in another unit was promised. It is also interesting to note that the Calgary Board of Education (Public) on September 21, 1984, issued a memo to all teachers and principals stating,

> New teachers who will be hired by the Board after July 1986, will be required to show evidence that they have achieved, or are willing to achieve, at least the second or 'function' level of competency. All of our Alberta universities have been notified of this requirement.

The Calgary Board has been the largest single employer of U of C Education graduates.

Considering the speed by which this course was made compulsory, it is reasonable to expect some problems to arise. We were not disappointed. What was surprising was the nature of these problems coming as they did from unexpected directions and in addition to those normally anticipated. The first and most serious was the deletion of the $10,000 intended for software from the Faculty budget in the wave of cuts

that swept the University. Only $2,000 of this "oversight" was recouped. The jurisdictional and territorialistic disputes that arose initially over equipment and staffing can be directly attributed to the haste in introducing the course. Promised hardware did not appear until almost the end of the first offering and is still in short supply. Instructors wishing to mark assignments were obliged to use their personal computers, or as in one case in the Winter Term, mark assignments without having one available. Amid this litany of misadventures, there was one very bright spot. The technical services department kept our equipment functioning at almost 100% level at all times.

Planning the course began almost immediately in April 1984 with the three professors assigned to teach the new course. One, the author, was completely new to the area. Another, shortly thereafter, was seconded to a major University research project so that many of his needed services were lost and completely so after the Fall Term. This author gave up the remainder of his sabbatical to help design the course and to develop the new discipline as much as possible before the start of classes. Graduate Teaching Assistants were hired up until the first day of classes to meet the rest of the teaching commitments. For the Winter term, a professor knowledgeable about computers and deemed redundant to his Department, was transferred to the Department and added to the teaching team. All these arrangements did not prove to be entirely satisfactory, and certainly did not make for high overall student course ratings.

The course was planned along two dimensions: first, it was agreed that lab time would equal instruction time; and second, computer literacy by definition would involve knowledge of the computer's operation, an introduction to programming, an exploration and evaluation of CAI and CMI

programs, and the classroom and societal implications of computer technology. The former dimension meant that what was listed as a 3-2 course would be actually be taught as 3-3. The second meant that because of budget restrictions, maximum use of the limited software available would be necessary. All instructors would have to carry lab responsibilities. Notwithstanding that these duties amounted to almost full-time teaching with few breaks, no credit for them is recognized. With one exception, all marking was done by each instructor. After the fact, if we had to describe the model we used, that of Sternberg and Caruso (1985) comes closest to our intention.

Inasmuch as there were only 12 Apples (mostly II+'s of early vintage) available at the start, it can be seen that with classes of 30 and more, equal lab time did not mean equal hands-on time and a system of paired and tripled teams emerged in the lab. This had a further spin-off in that extra "open" lab time had to be made available in order that individual lab assignments could be completed. This, in turn, created problems in finding funds and a more serious one of finding time to even hold the extra labs as all computer facilities on campus are fully booked. (Here the ingenuity of the students came to the fore - but that is another story in itself!) Were this not enough, the problems of the course were further compounded by the scheduling of professional year classes due to the introduction of the extended practicum. What this has meant is that all conventional 13 week courses taught in the Fall term are over-scheduled and taught in 10 weeks. The Winter term courses, similarly, are taught in 7 weeks. Thus it was that for Elementary route students, for example, in the Fall term their classes were 3 hours long, twice a week, and 4 hours long, twice a week in the Winter term.

Further, for this particular group of students, the 7 weeks of instruction were so distributed that these students could not get all their allotted instruction time. Consequently, the mid-term examination was held outside of class time - a move that was somewhat less than popular with the students. (The problems of classroom space will be ignored as these were hardly unique to this course but were a further cause of friction.)

Given the above parameters, the actual curricular emphasis was as follows:

LECTURE TOPIC	LAB TOPIC	TIME ALLOTTED FALL	WINTER
1. Introduction to Computers in Edn.	Introduction to Microcomputers (Apples)	1	½
2. LOGO and Instructional Design	LOGO Activities	2	1½
3. Word Processing and Utility Programs	Bank Street Writer Assignment	1½	1
4. Instructional Design and Comp. Asst. Inst.	Examine and Evaluate CAI Programs	2	1½
5. BASIC and Instructional Design	BASIC Activities	2	1½
6. Computer Literacy, Future Computer Technology, Review*	Computer Literacy Lesson Plan	1½	1
	TOTAL:	10 weeks	7 weeks

* Not done in the Winter Term.

It must be noted that these time distributions are approximate because lab time was sometimes used for instruction, and vice versa. Because the course was taught in such large blocks, which proved to be a blessing in

disguise, and because class sections were paired, half of each period was in class and the other half was in the lab. The scheduling of the other class of the pair was just the opposite. This order was reversed for Elementary route students after each class to even the lab-first sequence for each class during each week of instruction.

Evaluation of course work proved to be a continuing problem notwithstanding the relatively specific criteria and mark schedule set out in the lab manual for each project. A second problem concerned inter-instructor marking variability notwithstanding the provision of marking keys. The number and weighting of assignments and examinations towards the course grade were as follows:

DESCRIPTION	TYPE	FALL TERM	WINTER TERM
1. Logo Project	Lab Project	9	9
2. Bank Street Writer	Lab Project	9	9
3. Mid Term	Examination	25	20
4. Evaluation of CAI	Lab Project	9	9
5. BASIC Project	Lab Project	9	9
6. Instructional Design	Project	9	9
7. Final	Examination	30	35
	TOTAL	100%	100%

All examinations and projects were basically the same from term to term with two exceptions. In both the Logo and BASIC projects, the students in the Fall term became compulsive programmers and consequently, turned in assignments that not only represented many long hours of work, but which far exceeded the expectencies of the course. In the Winter term for these two projects, the parameters were restricted to reduce this overzealousness as much as possible. The second change was in the weighting of the mid-term and final examinations. This came about partly from feedback from the students and partly from concern by the

instructors. The feedback suggested that the mid-term should be reduced in value by 5% and this added on to the final as the students were only then truly starting to "get the hang of things." No similar comments were heard from the Winter term students which suggests that this was a wise move. It was surprising to discover that the Fall term students maintained a vested interest in the Winter term offering of this course claiming that we had now made the course too easy!

In a way, they could be right for the two "programming" lab assignments. We quickly discovered in the Fall term that extra lab time was urgently needed. With lab facilities so heavily booked everywhere on campus, these had to be scheduled at some very weird hours and on the basis of one extra hour of computer time per student per week. Administrative procedures had to be introduced to prevent abuses, lab supervision provided and paid from then non-existent funds, and for the Sunday open labs, a rent-a-cop hired to admit students to the building and to the lab. Even this amount of time (one extra hour per student per week) did not seem adequate for the Fall term students across the course, but for the Winter term, it proved to be just about right.

What were the students reactions to all this? First, in the Fall term, the students were sometimes scathing in their informal comments about the way things were going and about their instructors. This was particularly so for one of my classes and who, according to my colleagues who also had this group in other classes, could best be described as "pugnacious." In fact, all classes appeared to be "more difficult" this year than usual, possibly because of the competition for the few teaching positions expected to be available this year. Others have argued that it was just the luck of the draw. In any event, there was a marked

difference in the attitude and classroom behavior of Fall term and Winter term students. Since the author remained in contact with one of the Fall term classes in a Winter term course, he discovered that of this group of about thirty students, at least five had taught computer literacy units in their first round of student teaching, and another two would have done so had there been time. What was even more surprising, of the sixty students in his computer literacy course in the Winter term, four had taught units in computer literacy in their first round of student teaching even though they had had no prior experience with computers whatsoever. Finally, when it came back that all recruiters were asking the extent of student knowledge about computers in their job interviews, one can only suggest that the word was out. This change in attitude was even apparent in the previously negativistic Fall term class but by then the Fall EDTS 425 course evaluations had long been in.

Further, our feedback to date from our contacts in the schools would suggest that they highly approve of what we are doing and of our products. From our own personal perspectives, while we will probably never be completely satisfied with what we have done, we are, on the other hand, well pleased that we have achieved if not exceeded our initial goals and particularly so under the conditions related above. The comparison between the students in their first day and last day in class simply blows one's mind. You literally can see them change before your very eyes.

How do our students rate the course? This author cannot speak for his colleagues but he can share the evaluations of his classes of prospective elementary teachers from both terms. These ratings are taken before the end of the term and always before the course grades are

posted. As noted, the differences between the Fall and Winter term classes were striking. Some of the differences are readily apparent. Others show little or no difference from term to term. Remember that for all intents and purposes, the lab assignments were the same. This is even truer for the course content and the two common examinations in particular. The ratings were as follows:

		DISAGREE (LOW)				AGREE (HIGH)	MEDIAN
	TERM	1	2	3	4	5	RATING
1. Rate the course content	F	-	10	19	16	1	3.11
	W	1	2	13	21	4	3.74
2. Rate the instructor	F	7	6	18	8	2	2.97
	W	2	6	10	19	4	3.66
3. Rate the course in general	F	1	10	16	10	1	3.16
	W	1	2	18	10	2	3.50
4. Was there agreement between announced course objectives and what was taught?	F	-	2	14	15	5	3.97
	W	-	1	3	15	22	4.59
5. The grading procedures for the course were:	F	3	8	10	14	7	3.54
	W	1	8	13	12	7	3.42
6. How much do you feel you have accomplished in this course?	F	-	-	13	16	13	4.03
	W	-	2	6	16	17	4.00
7. Compared to other courses, how much effort did you put into this course?	F	-	-	5	20	17	4.33
	W	-	2	6	21	12	4.12
8. Did this course improve your understanding of concepts and principles in this field?	F	-	-	4	15	23	4.61
	W	-	2	1	15	23	4.63
9. Did this course increase your interest in the subject matter?	F	-	-	9	18	15	4.19
	W	2	2	4	16	17	4.31
10. The instructor's knowledge of subject was:	F	-	1	15	19	7	3.79
	W	-	-	6	15	20	4.50

	TERM	DISAGREE (LOW) 1	2	3	4	AGREE (HIGH) 5	MEDIAN RATING
11. Was the progression of the course logical and coherent from beginning to end?	F	1	6	13	17	5	3.59
	W	1	4	7	21	8	3.93
12. Did instructional materials appear to be conscientiously prepared or chosen?	F	-	2	11	24	4	3.85
	W	-	1	13	13	14	4.04
13. How well did examination questions reflect content and emphasis of the course?	F	-	4	4	24	10	4.16
	W	-	3	5	17	16	4.26
14. Was the grading system for the course explained?	F	1	7	8	18	8	3.81
	W	-	3	11	15	12	3.97
15. How appropriate was the amount of work required for the credit earned?	F	4	10	7	15	5	3.55
	W	4	7	10	10	10	3.50
16. Do you feel course objectives were accomplished?	F	-	3	10	19	9	3.95
	W	1	1	8	23	9	3.98
17. Did this course maintain your attention throughout the semester?	F	-	5	13	16	8	3.72
	W	1	4	8	15	13	4.03
18. I prepared before coming to class.	F	-	4	15	18	5	3.64
	W	1	3	9	18	10	3.84
19. Rate the relevance of course content to your major field.	F	1	8	10	14	12	3.68
	W	3	3	6	19	10	3.97
20. How would you characterize the instructor's ability to explain?	F	3	12	18	7	2	2.86
	W	1	9	12	15	4	3.42
21. The instructor stimulated my intellectual curiosity.	F	1	7	17	14	3	3.29
	W	-	8	18	7	8	3.22
22. What was the instructor's attitudes; how did he deal with you?	F	-	5	10	16	11	3.91
	W	1	-	10	14	16	4.21
23. The instructor promoted an atmosphere conducive to work and learning.	F	3	6	13	13	7	3.46
	W	1	1	10	21	8	3.93

	TERM	DISAGREE (LOW) 1	2	3	4	AGREE (HIGH) 5	MEDIAN RATING
24. Classroom facilities were:	F	4	10	10	11	5	3.25
	W	-	8	14	9	10	3.43
25. I would have preferred to work individually in the lab than with a partner.	F	12	8	6	5	11	2.75
	W	5	10	14	5	7	2.93
26. Too much emphasis was placed on developing only technical skills.	F	8	3	22	6	3	2.98
	W	5	13	15	6	2	2.70

It can be appreciated that when the Fall term ratings were received, they were grounds for both optimism and pessimism. On inspection, they seem grossly contradictory. The following words from a sign on the author's office wall best describe his reaction to them:

> We the willing, led by the unknowing, are doing the impossible for the ungrateful.
> We have done so much with so little that we are now qualified to do anything with nothing.

Given the antagonisms of the Fall term classes, and one class in particular, it was a pleasant surprise to see the Winter term classes come in and go about their business with little fanfare. Their ratings at the end of the course, notwithstanding a horrendous workload in all courses cummulating at the end of the term, suggest a completely different set of attitudes, and except for one project, their work seemed superior to the earlier classes. The exception was the last instructional design assignment which was due at the same time and therefore, in competition with due assignments from other classes and which had higher weightings towards their final grade than 9%. Overall for this one assignment, they simply did not equal the high standards set by the Fall

term students. Incidently, this particular assignment will be dropped from next year's course on the basis of redundancy. Certainly we learned from the first offering of the course, but personally, the author changed nothing in either his approach or in the format and content of his classes in the Winter term.

The other findings from the students ratings at large are worth noting. The students saw the course as heavy and were of varied opinion of the degree this was reflected in their course mark. At the same time, they felt they had accomplished a great deal in terms of understanding and the implications of the area for the schools and their specialization. Most reported preparation in anticipation of class. (This appeared to be an exaggeration for the Fall classes!) For many, the course aroused some interest in computers and proved to be modestly interesting. However, there seemed to be an emerging concern particularly among the Winter term students that the course was emphasizing technical skills.

Notwithstanding anticipated complaints about the content sequencing, the text and the printed material handouts, the actual ratings proved less damning than expected. Further, as noted earlier, there was a love/hate relationship between the author and his Fall classes in particular. This may have exaggerated the ratings because about one third of the students did not bother to complete the course rating form.

Most surprising were the student evaluations of classroom facilities. While the Fall term students tended to give a wider spread of ratings, the Winter term students seemed more accepting, perhaps because by then they had seen what conditions are actually like in the schools. While the Fall term students tended to be dichotomous in their views

about working alone or with a partner, the Winter term respondents were less clear in their preferences. The data does suggest that there should be sufficient hardware in order that some but not all students will have a computer of their own in the lab. As already noted, some students as well as the author saw evaluation as a problem, too. For the record, in written comments in addition to the ratings, the author was seen as a fair but hard marker compared to his colleagues by many of those reporting.

In summary, the data would suggest that, overall, the course objectives were seen as being met, not just by the instructors, but by the students as well. Generally, ratings of the course by most students were considered favorable.

The only evaluation of anything closely resembling the EDTS 425 course that this author has been able to locate in the literature was that of a four week summer school program for American secondary teachers and reported by Stecher (1984).* His was essentially, but not exclusively, a case history study concentrating on 28 participants and their trainers (2) in one class but also collecting data from two other similar classes. (Compared to EDTS 425, their equipment and classroom facilities can only be described as luxurious.) Stecher (p.41) reports 23 variables that contribute to the success of the program:

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* Lorelei Rogers and the author are completing a study of U of C education in-service course student attitudes. A large proportion of the sample had been enrolled in computer courses. Regrettably, we have been unable to identify these students per se.

Programatic Features	Contextual Elements
Adequate Learning Time	Hardware Availability
Clarity of Goals	Software Selection
Group Interaction	Institutional Support
Planning for Implementation	Classroom Facilities
Structured Lessons	Computer System Features
Software-Based Assignments	
Voluntary Participation	
Attention to Social Needs	
Reduced Distractions	
Use of Supplemental Expertise	

Personal Characteristics

Respect for STudents
Knowledge of Computers and Their Use in Education
Flexibility
Familiarity with Schools
Creativity
Sense of Humor
Strength of Personality
Evaluativeness

In as much as he has prioritized these variables, he summarizes his findings as follows:

> Without a doubt the provision of Adequate Learning Time, and appropriate Hardware and Software are indispensible. Similarly, it is hard to overemphasize the importance of Clear Goals, Planning for Implementation and the provision of opportunities for Group Interaction. Instructors should certainly possess a thorough Knowledge of Computers and Computer Use in Education. (p.40)

These findings run strikingly close to those we found and had considered vital. Perhaps Stecher best summarizes all our experiences as follows:

> Other studies have confirmed the importance of many of these key factors. Adequate time on the computer and opportunities to plan for integrating the computer into the curriculum are the elements reported most often in the literature that exists on this topic. Shavelson, et al. (1983) reported that teachers wanted on-site computer inservice training that provides "as much hands-on practice as possible" (p.87). Kane et al. (1983) found that what teachers "want most was more time to use the machines, to develop their expertise, to review available software and plan for its use in the classroom" (p.19). Similarly, OTA (1982) concluded that information technologies can be most effectively applied to tasks when they are well integrated into their institutional environment. (p.40)

What recommendations can be made? There are several personal ones other than the obvious ones of having enough hardware and software of all kinds on hand before you start. Even this one point has a prologue. We have already been informed that there will be no monies budgetted for this course for next year (1985-86). However, the EDTS 425 course coordinator was recently given less than two days at the close of the past fiscal year to spend $6900 surplus Faculty funds on software. For this coming year, at least, our software picture will be a hundred times better than the past year's. On a personal level, here are some other considerations:

1. Pilot the course first before you dare offer it on a large scale if for no other reason than to eliminate the administrative kinks. There are other obvious advantages to this as well. This is viewed as a MUST recommendation.
2. Be prepared to give up large blocks of your time to do very little else when you are teaching and marking this course, especially in the early stages of its offering. This will do little to enhance your professional career at this point unless you can work it all into some kind of article acceptable to a refereed journal. Similarly, by the very nature of computer literacy, or at least by the way we have defined and taught it, the course content cannot flow smoothly. In other words, do not depend on highly favorable student ratings to offset a lack of research effort. On the other hand, it is a splendid and rewarding way to work one-on-one with students if that is your bag. If it isn't and/or you can't wait for the course to develop, avoid it like the plague.

3. Speaking of research, once the course is set-up and running smoothly, it affords an excellent opportunity for operational research in conjunction with other aspects of the teacher education program, e.g., methods, tests and measurement courses come immediately to mind. Beyond this and again quoting Stecher (1984: p. 39),

> There is little doubt about the need for research to identify effective strategies for computer education. The Congressional Office of Technology Assessment (1982) reported that "widespread use of technology in the classroom will require that teachers be trained both in its use and in the production of good curriculum materials" (p.9). Unfortunately, the report concluded "... there is little evidence that most of the teacher training colleges in the United States are providing adequate instruction to new teachers in the use of information technology" (p.10).

4. Being knowledgeable about computers per se is no ticket to computer literacy as programming is such a small part of it. Our plans are to even reduce the programming component further since this is seen primarily as a technical skill. Further, programming seems to be handled well through school and U of C in-service programs. On the other hand, CAI is a discipline in its own right and when shared with a subject area specialization, it is even bigger. Take time, somehow, to really get into the literature and particularly, that on computer literacy (e.g., see Renderson (1984) as a start). The discussions and continuing debate are fascinating. The author does not regret what has now been classified as "wasting" five months of his sabbatical to retread himself to work in this area and in helping to prepare this course. In retrospect, he only wishes he had taken longer to explore some areas he barely had time to touch!

5. It is his personal belief that computer literacy can best be attained initially against a background of learning theory rather than philosophy of education. Further, those of his computer literacy students who were also taking the tests and measurements course from him, did particularly well on the CAI program revision project - probably because the formatting skills in each are so complementary.

6. Be prepared to be in a constant state of change. You are on the cutting edge of things to come. The schools will quickly catch up, and it can be guaranteed that the incoming students will be increasingly knowledgeable - both at an accelerating rate. You will have to keep running hard to even keep up to them. One example will clearly illustrate this point. This is the first time in this author's experience that a course text two years old was selected in June and was found to be obsolescent by the time classes started in September. Accordingly, you can expect to produce (and charge for) great volumes of class handouts. The students seem to like them.

To sum up, it has been, at best, a most trying and demanding stress-laden year. On the other hand, it has been a challenge. Problems have been faced head-on and most were overcome by fair means or foul. It proved to be a wonderful opportunity to work with individual students again and to actually see the fruits of one's labors. Our students, for the most part, came to accept the challenges of being pioneers, too. Moreover, we did it. We did meet and were seen to meet the goals we had set for ourselves despite everything that seemed at times to work against

us. I can only think of the paraphrased words of the Ruler of the Queen's Navee and the Pirate King, "If your soul isn't fettered to the research tool..., what a glorious fling it is to be a leading thing." Regretably, I will not be there with you, much and all that I would wish otherwise. So please, "go out there and win one for the griper."

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